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Study of thermal and electrical parameters of workpieces during spray coating by electrolytic plasma jet

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Abstract

In this paper the results are presented of thermal and electrical parameters of products in the system bottom layer - intermediate layer when applying protective coatings of ferromagnetic powder by plasma spray produced in an electric discharge with a liquid cathode, on steel samples. Temperature distribution and gradients in coating and intermediate coating were examined. Detailed descriptions of spray coating with ferromagnetic powder by plasma jet obtained in electrical discharge with liquid cathode and the apparatus for obtaining thereof is provided. Problem has been solved by using of Fourier analysis. Initial data for calculations is provided. Results of numerical analysis are provided as temporal functions of temperature in contiguity between coating and intermediate coating as well as temporal function of the value $Q=q-\varphi$ where q is density of heat current directed to the free surface of intermediate coating, φ is density of heat current in contiguity between coating and intermediate coating. The analysis of data given shows that in the systems of contact heat exchange bottom layer-intermediate layer with close values of the thermophysical characteristics of constituting materials is observed a slow increase of the temperature of the contact as a function of time.

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